6BN6

Beam Tube

7-PIN MINIATURE TYPE

For Use in FM and TV Receivers As Combined Limiter, Discriminator, and Audio-Voltage-Amplifier Tube

GENERAL DATA

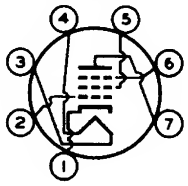
Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts ←
Current at 6.3 volts	0.3	amp
Direct Interelectrode Capacitances:▲		
Grid No.1 to cathode & internal shields, plate, grid No.3, grid No.2, and heater	4.2	μμf
Grid No.3 to cathode & internal shields, plate, grid No.2, grid No.1, and heater	3.3	μμf
Grid No.1 to grid No.3	0.004 max.	μμf

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Maximum Diameter	0.650" to 0.750" ←
Dimensional Outline	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7DF

Pin 1 – Cathode, Internal Shields
Pin 2 – Grid No.1
Pin 3 – Heater



Pin 4 – Heater
Pin 5 – Grid No.2
Pin 6 – Grid No.3
Pin 7 – Plate

LIMITER & DISCRIMINATOR SERVICE ←

Maximum Ratings, ***Design-Maximum Values:***

PLATE SUPPLY VOLTAGE	330 max.	volts
GRID-No.3 (QUADRATURE-GRID) VOLTAGE	●	
GRID-No.2 (ACCELERATOR-GRID) VOLTAGE	110 max.	volts
GRID-No.1 (LIMITER-GRID) VOLTAGE:		
Positive-peak value	60 max.	volts
CATHODE CURRENT	13 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	200 max.	volts
Heater positive with respect to cathode	200■max.	volts

← Indicates a change.

6BN6

Typical Operation:

In accompanying typical quadrature-grid-fm-detector circuit

Input-Signal Center Frequency	*4.5*	*10.7*	*10.7*	*Mc*
Plate Supply Voltage.	270	85	285	volts
Plate Voltage	121	63	122	volts
Grid-No.3 Voltage . .	●	●	●	
Grid-No.2 Voltage . .	100	55	100	volts
Cathode-Circuit Resistance★	200 to 400	200 to 400	200 to 400	ohms
Peak AF Output Voltage	16.8	6	16.6	volts
Minimum Grid-No.1 Signal Voltage (RMS) for AM rejection★ .	2	1.25	2	volts
Minimum Grid-No.1 Signal Voltage (RMS) for limiting action♦	1.25	1.25	1.25	volts
Plate Current	0.44	0.25	0.49	ma
Grid-No.2 Current . .	10	4.1	9.8	ma
Plate Load Resistor .	0.33	0.085	0.33	megohm
Linearity Resistor. .	1000	470	1500	ohms
Integrating Capacitor	0.001	0.002	0.001	μf
Coupling Capacitor. .	0.25	0.25	0.01	μf
Frequency Deviation .	±25	±75	±75	kc
AM Rejection:				
For grid-No.1 signal volts (RMS) = 2 .	25	31	20	db
For grid-No.1 signal volts (RMS) = 3 .	30	30	29	db
Total Harmonic Distortion.	1.8	2	1.6	%

▲ Without external shield.

● For proper operation of this electron tube in the accompanying Typical Quadrature-Grid-FM Detector Circuit, the Q of the quadrature-grid tuned circuit (L_1, C6) should be sufficiently high to assure that a 4-volt rms signal is developed at the quadrature grid when a 2-volt rms signal at the center frequency is applied to grid No.1.

It is recommended that L_1 be shunted by a capacitance of at least 10 μμf. This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of L_1, and a fixed capacitor.

■ The dc component must not exceed 100 volts.

★ The cathode-circuit resistance should be adjusted for maximum AM rejection at the AF output of the circuit at the specified grid-No.1 signal voltage. AM rejection is measured with an applied signal containing 30 per cent amplitude modulation and 30 per cent frequency modulation.

♦ At signal levels above specified value, limiting is within ±2 decibels.

OPERATING CONSIDERATIONS

To insure proper phasing of the signal voltage developed at the quadrature grid, the components of the quadrature-grid circuit should be shielded from those of the control-grid circuit.

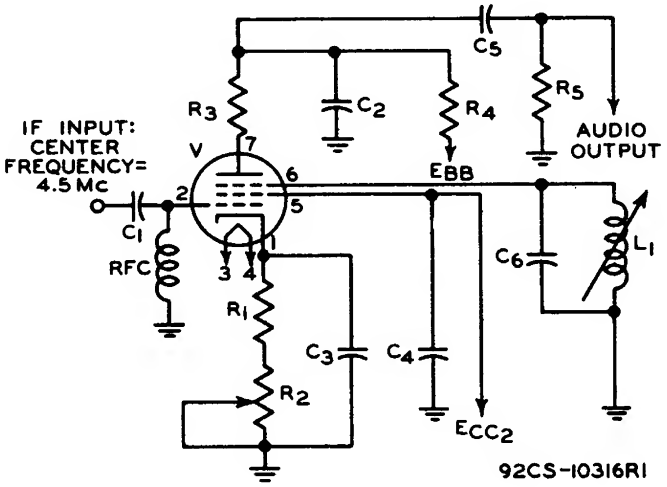
To obtain a symmetrical discriminator-response curve, the plate currents for no input signal and for unmodulated

→ Indicates a change.

input signal should be equal. To assure this equality, it is necessary that the plate voltage and grid-No.2 voltage have the proper values.

The proper plate voltage for any grid-No.2 voltage may be determined from the accompanying *Operation Characteristics* curve. This curve may also be used to determine the average dynamic plate current for any combination of grid-No.2 voltage and plate voltage.

TYPICAL QUADRATURE-GRID-FM-DETECTOR CIRCUIT



C_1: 100 $\mu\mu$f
C_2: Integrating capacitor, 0.001 μf
C_3 C_4: 0.01 μf
C_5: 0.25 μf
C_6: 10 $\mu\mu$f●
L_1: ●
R_1: 200 ohms
R_2: Cathode-bias potentiometer, 200 ohms
R_3: Linearity resistor, 1000 ohms
R_4: Plate-load resistor, 0.33 megohm
R_5: 0.47 megohm
V: Electron-tube-type 6BN6

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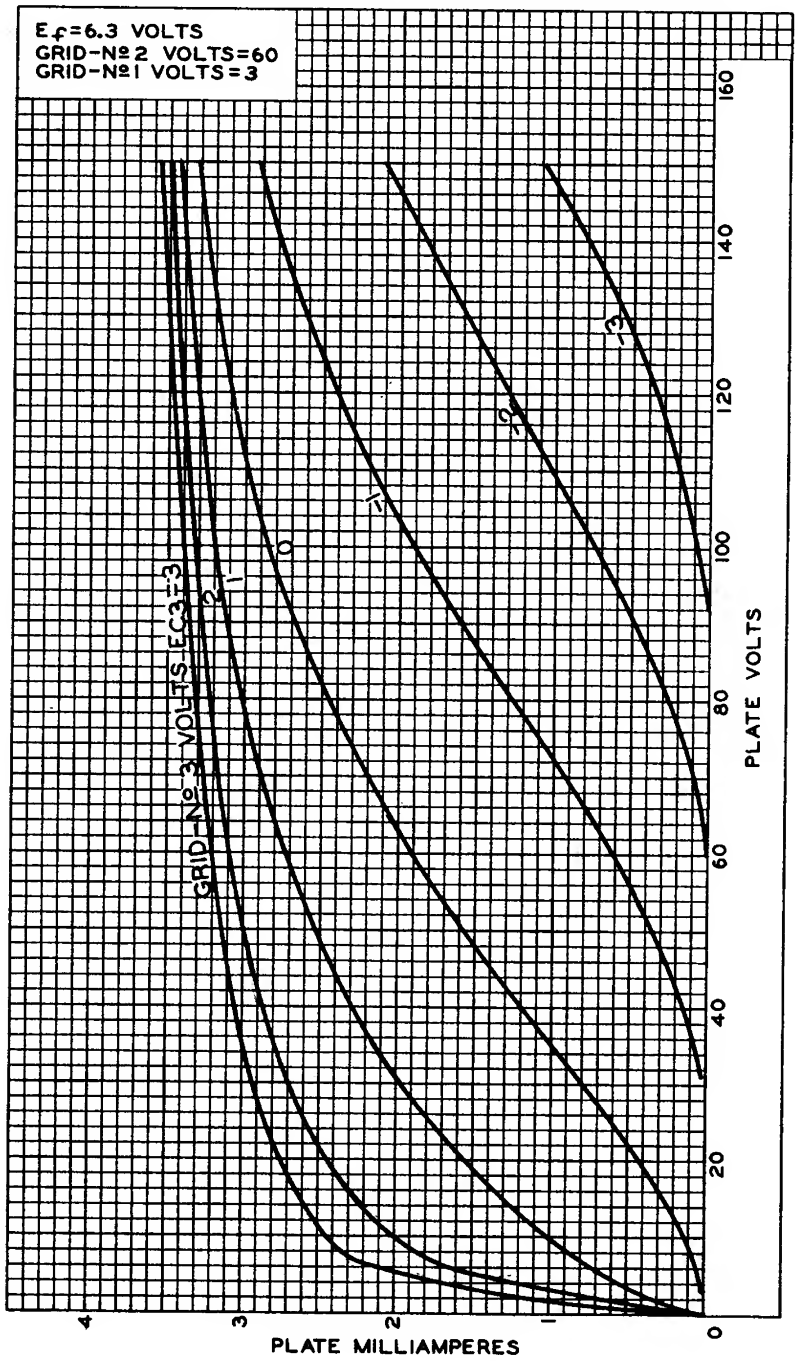
6BN6

AVERAGE PLATE CHARACTERISTICS



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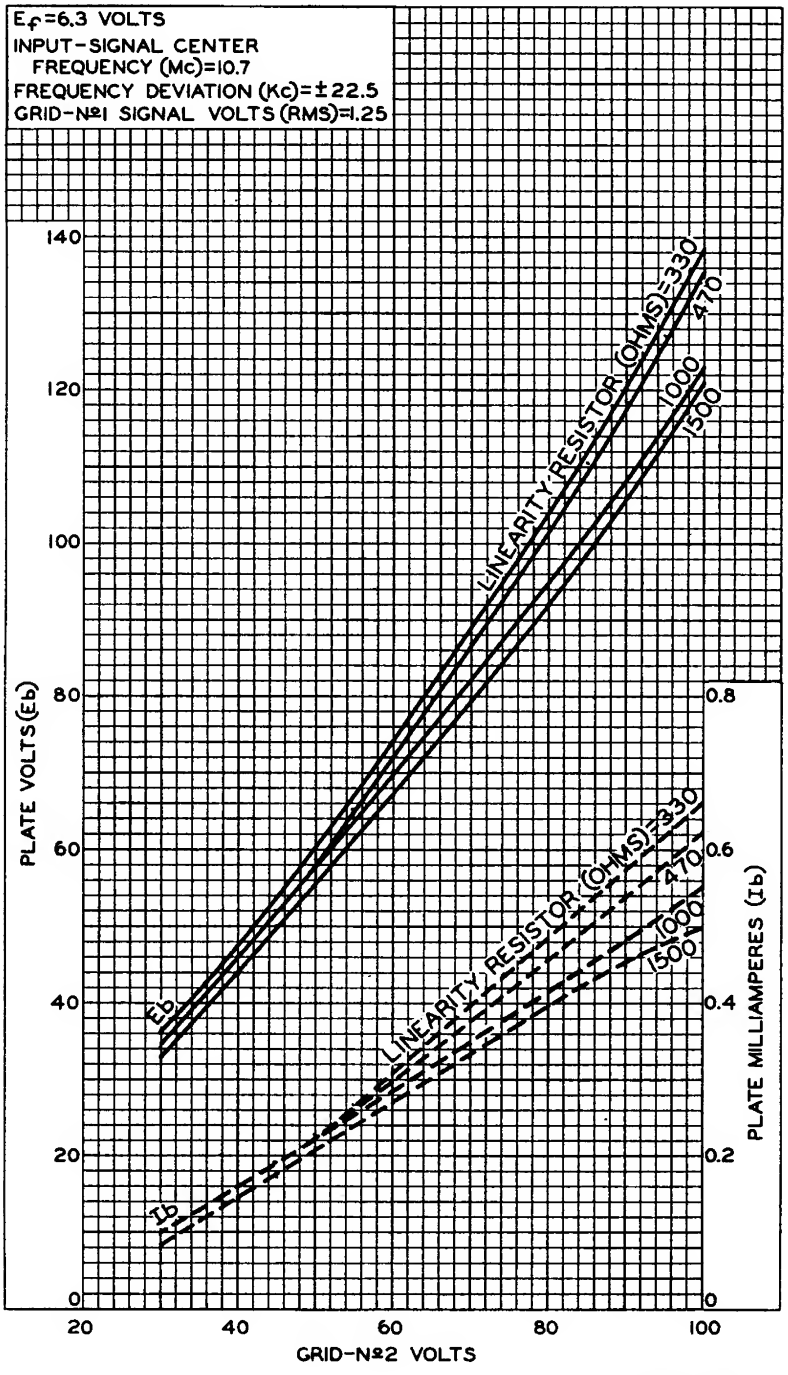
OPERATION CHARACTERISTICS



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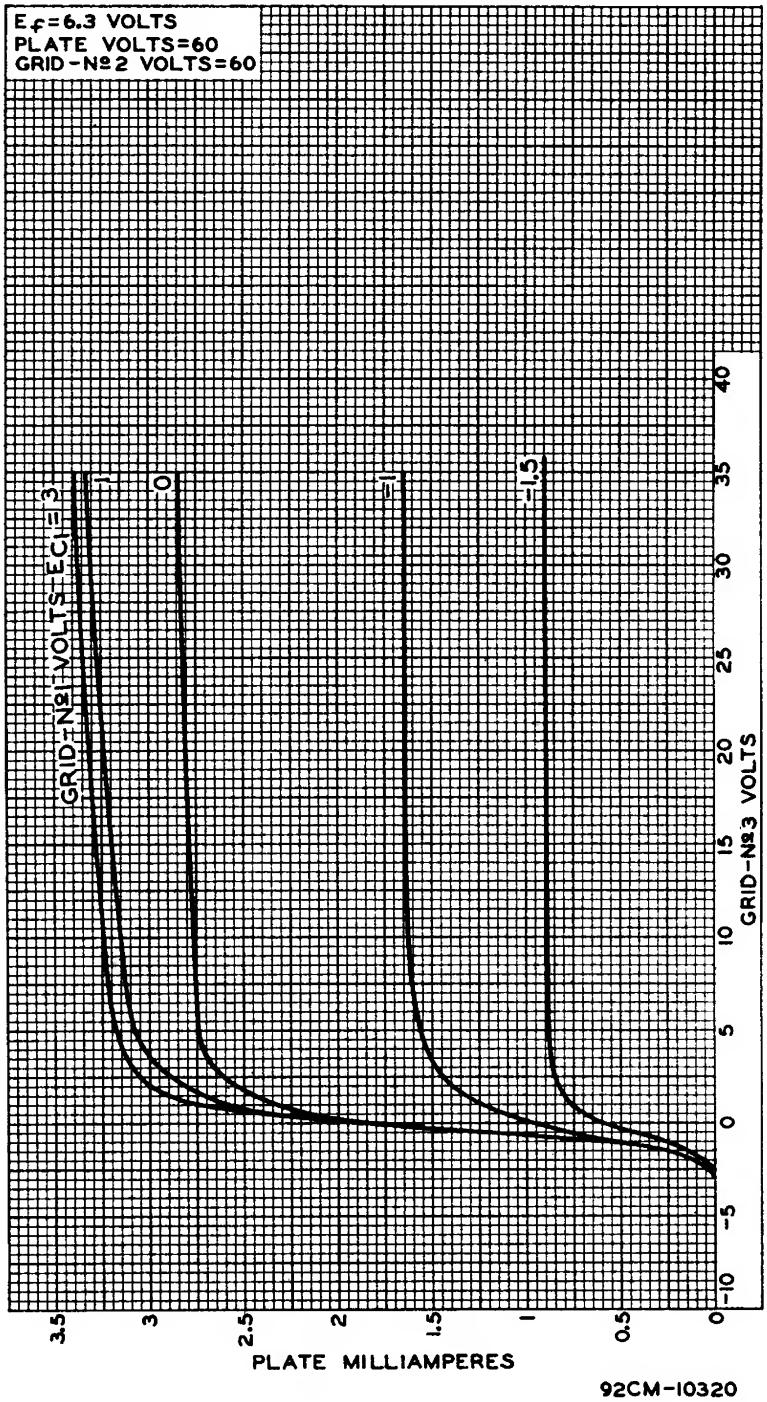
AVERAGE CHARACTERISTICS



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AVERAGE CHARACTERISTICS